



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: NV4181

Title: Assessment of Groundwater Recharge in Mine-Altered Regions of Nevada

Focus Categories: Groundwater, Hydrogeochemistry

Keywords: mining impacts, groundwater recharge, arsenic

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Congressional District: Nevada 02

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Abstract

This project proposes to determine the rate of groundwater recharge beneath disturbed mine lands in Nevada, with particular attention to heap leach piles, waste rock dumps and the associated issues of water quality with these areas. Specifically, we will analyze heap leach pile drainage data to determine rates of recharge from these structures. As heap leach piles are lined and drainage can easily be measured, these structures act as very large lysimeters, intercepting groundwater recharge before reaching the water table. The integrated fluxes through these structures, long after active leaching and rinsing has stopped represent deep infiltration. We propose to construct a statistical water balance model of recharge through these structures relating climate, surface properties, overland flow characteristics and soil (actually mined ore) hydraulic properties.

Preliminary data clearly show that enhanced recharge is occurring through heap leach piles as a result of limited vegetation and coarse soil texture at the surface. The behavior of these structures in arid parts of Nevada is markedly different than the surrounding undisturbed land where little recharge occurs due to well-developed soil horizons and established vegetation. At higher elevations, recharge rates through heap leach piles are fairly similar to that naturally found however.

Information on anticipated long-term infiltration through heap leach piles and waste rock dumps at precious metal mines in Nevada is critical for assessing the potential impacts of these structures on groundwater quality. At the present time, there are no direct measurements of the quantity of recharging water expected to be produced from these mined areas once they have been closed. In addition, we propose to monitor an existing mine site and apply a recently developed reactive arsenic transport model to develop predictive capabilities for not only the water flow but its long term evolution in quality.